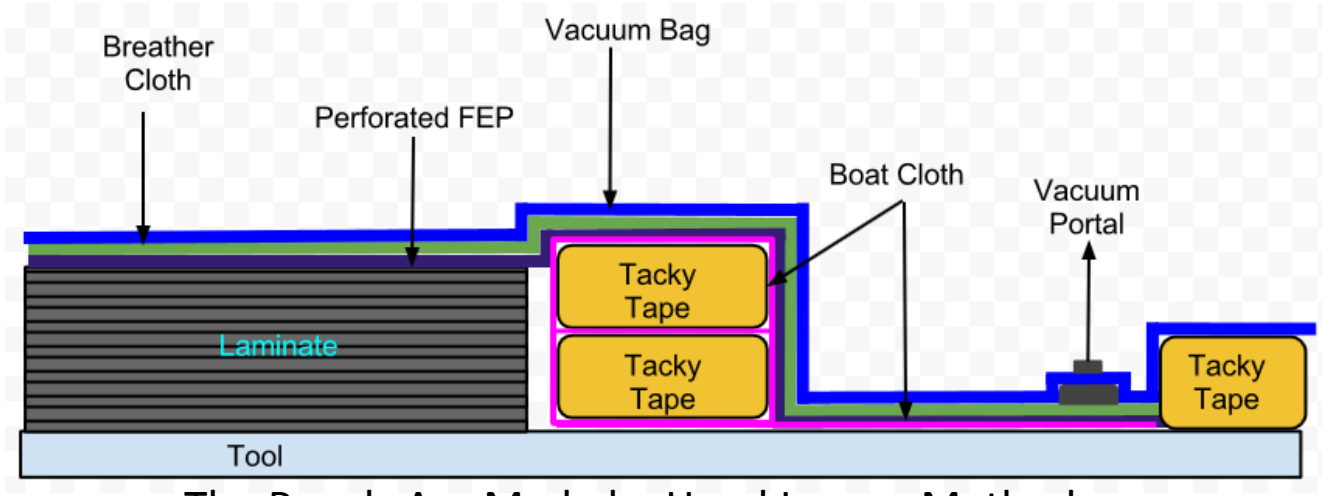
Composites at KSC

Sarah Cox

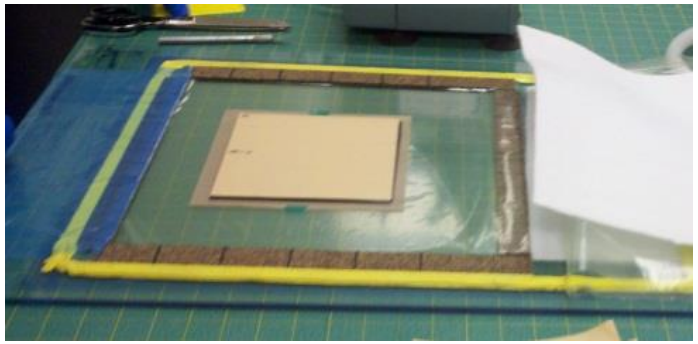
NASA Materials and Process Engineering

Kennedy Space Center, FL

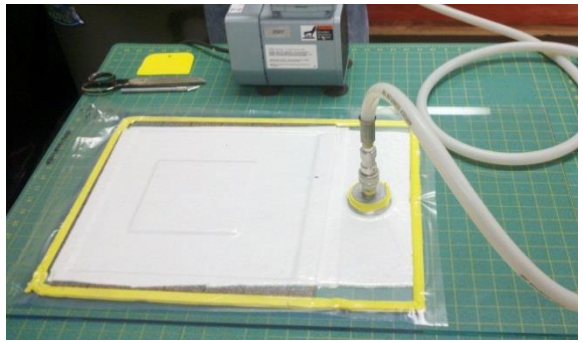
Out of Autoclave Panel Fabrication



The Panels Are Made by Hand Lay-up Method



Prepreg Sheets Hand Lay-up

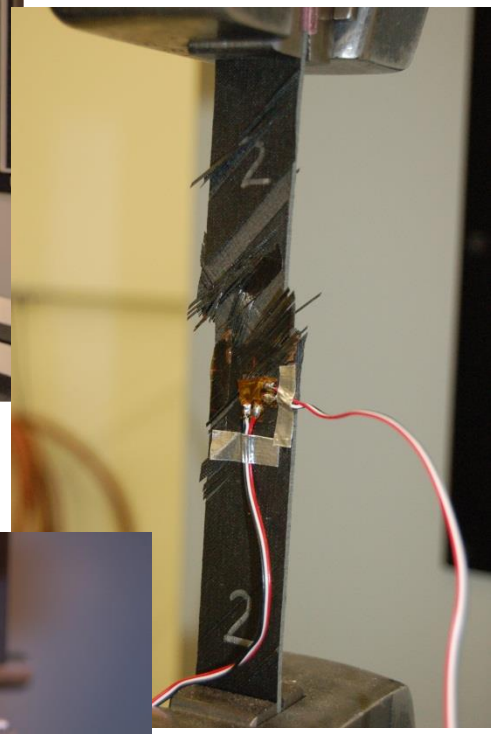


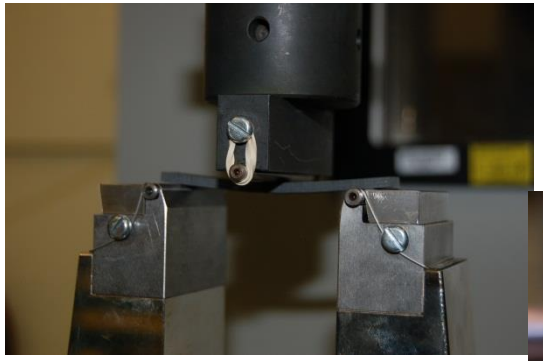
Vacuum Debulk of Composite Panel

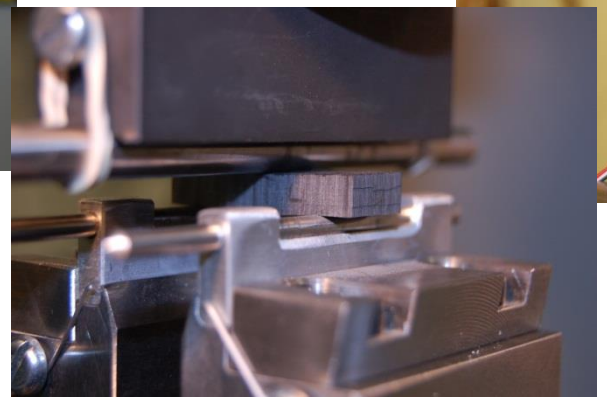
Oven Cure of Panel Under Vacuum

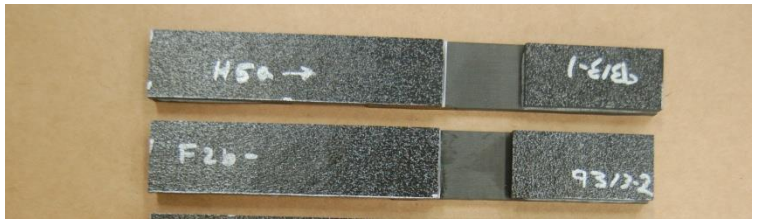
Composites Mechanical Testing

- Tensile
- Short Beam Shear
- In Plane Shear
- V-notch Shear
- Three Point Bend
- Combined Load Compression
- Lap Shear



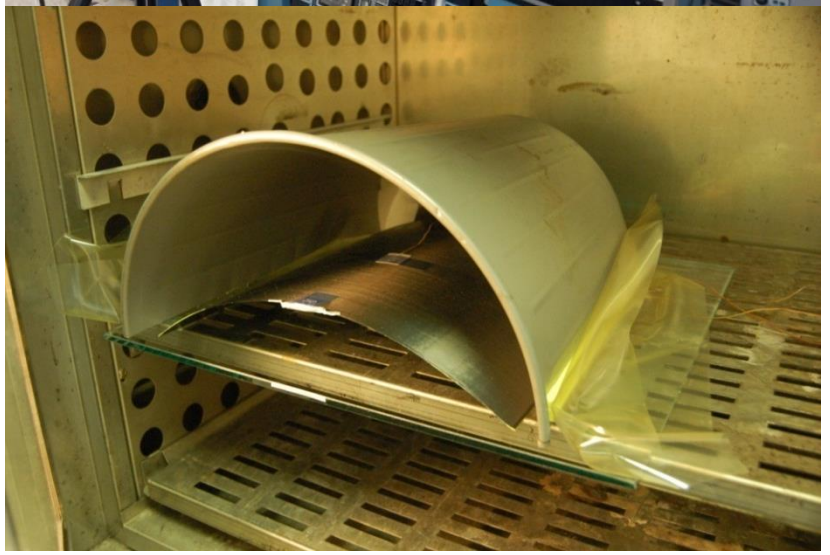




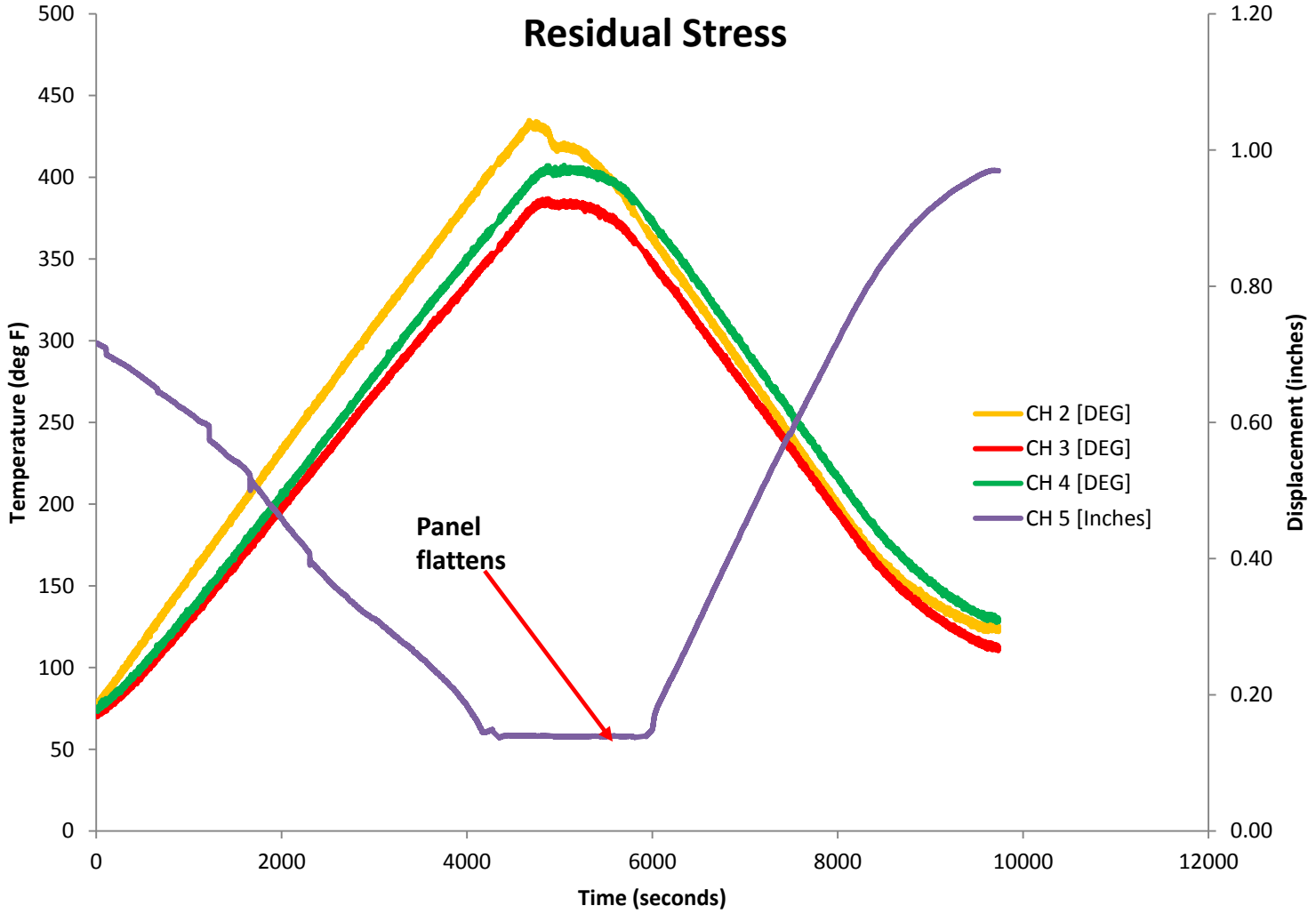


Stress Free Temperature Testing

- Thermal expansion mismatch between the fiber and the matrix causes residual stresses
- Determining the stress free temperature allows for calculation of the residual stress
- Testing performed to determine the stress free temperature
  - Asymmetric panels heated until they lie flat
  - Thermocouples used to measure temperature of the panel
  - Reflective tape and laser extensometer used to measure the distance from the top of the curvature to the glass plate

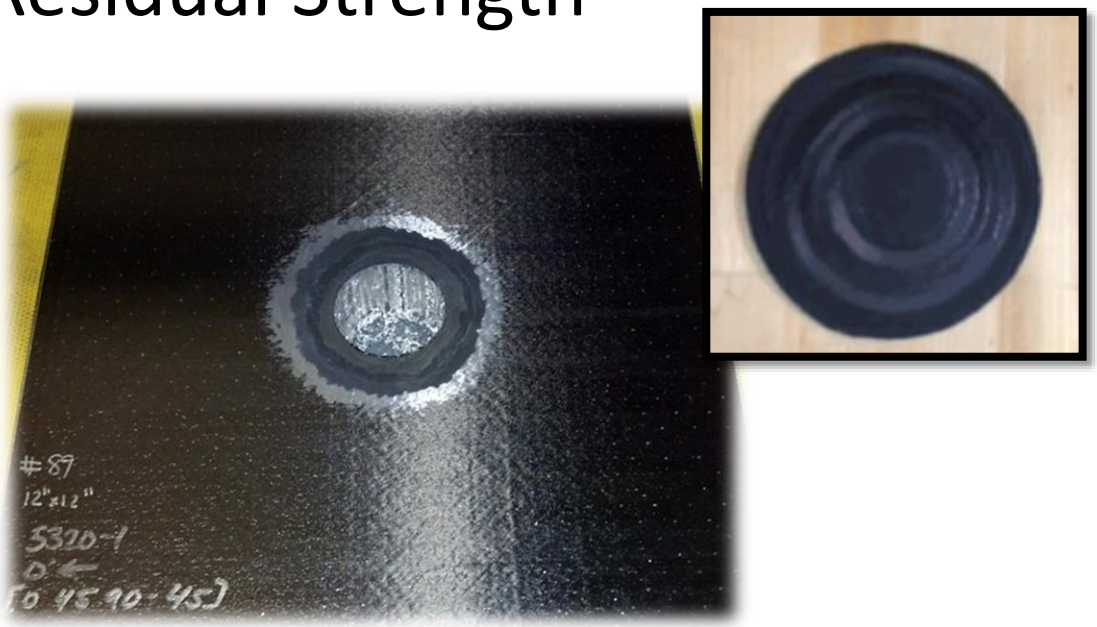


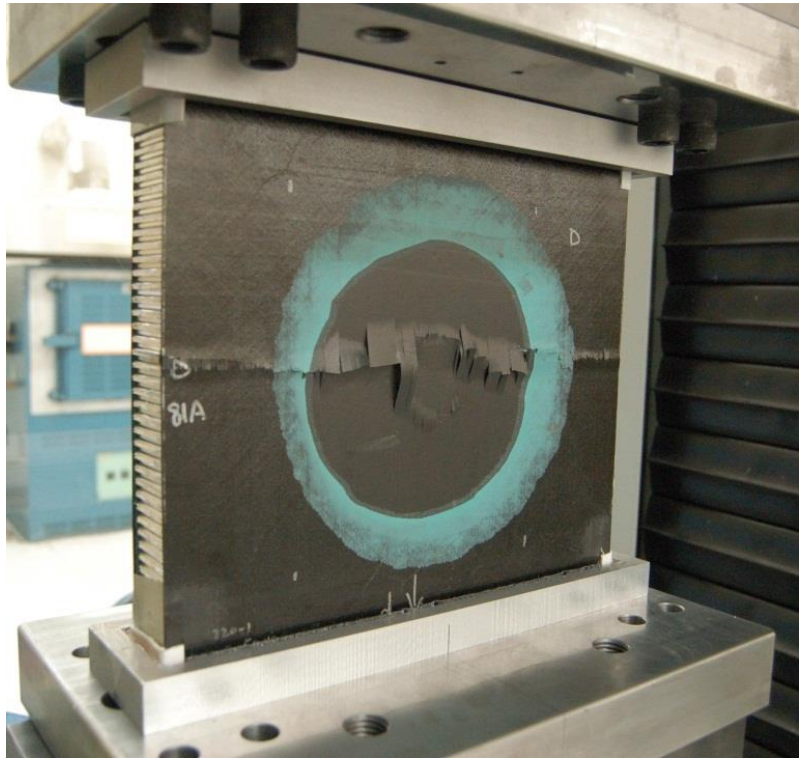
Residual Stress Testing Results



Repair Edgewise Compression Testing

- Repair Study
- Performed Edgewise Compression Testing to get Residual Strength





Plant Habitat

- ISS Payload
- A large self-contained growth chamber intended for long-term utilization
- Growth Chamber shell is a composite sandwich structure
  - Carbon/Epoxy Prepreg
  - Closed Cell Foam Core